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(54) WHITE CONDUCTIVE MATERIAL AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To form a white conductive material suppressing the elution of alkali metal ion from a substrate and excellent in conductivity and whiteness by successively laminating a first tin oxide layer consisting of a stannic compd. and contg. an antimony component and a second tin oxide layer consisting of a stannous compd. on the surface of the substrate.

SOLUTION: A first tin oxide layer consisting of a stannic compd. (stannic chloride, etc.) is formed on the surface of a substrate (fibrous potassium titanate, etc.), and further a second tin oxide layer consisting of a stannous compd. (stannous chloride, etc.) is formed thereon. At this time, the coating weights of the first and second tin oxide layers are preferably controlled to  $\geq 3$  pts.wt., based on 100 pts.wt. of the substrate, and 1-50 pts.wt. antimony as  $\text{Sb}_2\text{O}_3$  is incorporated into 100 pts.wt. of the first tin oxide layer, expressed in terms of  $\text{SnO}_2$ . As a result, a white conductive material suppressing the elution of alkali metal ion from the substrate is formed on the substrate surface.

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CLAIMS

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[Claim(s)]

[Claim 1] The 1st tin oxide layer in which it was the white conductivity matter with which the conductive layer which consists of tin oxide was formed on the front face of a base material, and said conductive layer was formed on the front face of said base material, and was formed from the second tin compound, White conductivity matter characterized by consisting of the 2nd tin oxide layer which was formed on said 1st tin oxide layer, and was formed from the stannous compound, and the antimony component containing in said 1st tin oxide layer.

[Claim 2] the content of the antimony component in said 1st tin oxide layer -- SnO<sub>2</sub> in said 1st tin oxide layer the amount of conversions 100 weight section -- receiving -- Sb 2O<sub>3</sub> \*\*\*\*\* -- white conductivity matter according to claim 1 characterized by being 1 - 50 weight section.

[Claim 3] White conductivity matter according to claim 1 or 2 which is the base material with which said base material is eluted in alkali-metal ion from the front face.

[Claim 4] It is the approach of manufacturing the white conductivity matter which has the conductive layer which consists of tin oxide on the front face of a base material. Distribute said base material in water, consider as a water dispersion, and the second tin compound and an antimony compound are added to this water dispersion. The second tin which deposits by making this react, and the water-insoluble nature matter of antimony are made to deposit on said base material front face. Next, the manufacture approach of the white conductivity matter characterized by adding a stannous compound to this water dispersion, dehydrating after making the water-insoluble nature matter of the first tin which deposits by making this react deposit on said second tin and the water-insoluble nature matter of antimony, and heating by the oxidizing atmosphere.

[Claim 5] The manufacture approach of the white conductivity matter according to claim 4 characterized by depositing each water-insoluble nature matter by adding an alkaline solution to coincidence and adjusting pH of said water dispersion to 2-5 in case said second tin compound and antimony compound, and said stannous compound are added to said water dispersion.

[Claim 6] said antimony compound -- SnO<sub>2</sub> of the addition of said second tin compound the amount of conversions 100 weight section -- receiving -- Sb 2O<sub>3</sub> \*\*\*\*\* -- the manufacture approach of the white conductivity matter according to claim 4 or 5 characterized by the thing used as 1 - 50 weight section to do for amount addition.

[Claim 7] The manufacture approach of the white conductivity matter given in any 1 term of claims 4-6 said whose base materials are base materials eluted in alkali-metal ion from the front face.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the white conductivity matter with the conductive layer which consists of tin oxide on the front face of a base material, and its manufacture approach.

[0002]

[Description of the Prior Art] Development of a conductive ingredient is desired rather than before with remarkable development of the electronics industry. Although carbon black and the metal powder which are generally used as a conductive ingredient have very low electric resistance and being excelled in conductivity, since a color tone is a black network, the application is limited.

[0003] As white conductivity matter which can be colored, the conductive titanium oxide of what covered the front face of titanium oxide with tin oxide, and the white covered with the tin oxide which doped antimony is indicated (JP,53-92854,A, JP,58-209002,A, etc.).

[0004] Moreover, it is known that the direction which is the configuration which has the shape of a needle and which fibrous anisotropy can give desired conductivity by the fewer blending ratio of coal rather than the configuration as a conductive ingredient is spherical. Therefore, development research of the white conductivity ingredient in which conductive layers, such as tin oxide, were formed on the front face of base materials, such as fibrous, is performed briskly.

[0005] In JP,61-26933,B, the white conductivity matter which uses as a principal component the fibrous potassium titanate which covered the front face with tin oxide is indicated. Moreover, in JP,63-233016,A, the needlelike conductivity titanium oxide which covered tin oxide and antimony oxide on the front face of high definition needlelike titanium oxide is indicated. Moreover, in JP,6-183737,A, the conductive titanium oxide fiber which covered tin oxide and antimony oxide on the front face of monoclinic-system titanium oxide fiber is indicated.

[0006] By the way, since sufficient conductivity will not be acquired if a conductive layer is formed only by tin oxide, dope antimony, an oxygen defect is made to exist in a crystal lattice, and conductivity is made to discover in these conventional white conductivity matter. However, although conductivity will improve if antimony is made to contain, it is in the inclination for a whiteness degree to fall.

[0007] Then, the white conductivity ingredient which has tin oxide which does not contain antimony as a conductive layer is examined. Only a tin compound is made to adhere to a base material, without making antimony contain, it heat-treats by the non-oxidizing atmosphere or the reducing atmosphere after that, an oxygen defect is made from JP,6-207118,A in tin oxide, and the method of making conductivity discover is indicated.

[0008]

[Problem(s) to be Solved by the Invention] However, even if heat-treated in such a non-oxidizing atmosphere or the reducing atmosphere, too, tin oxide colored it blue gray - black, and there was a problem that the white conductivity matter which has a high whiteness degree was not obtained. Moreover, though natural, in order to make a non-oxidizing atmosphere etc., the gas according to the facility and ambient atmosphere which were sealed, and its introductory facility were needed, and it

became disadvantageous in manufacturing cost.

[0009] Moreover, since potassium ion was eluted from such a base material when fibrous potassium titanate etc. was used as a base material, in the field of the electronics with which existence of alkali-metal ion is disliked, there was a problem that the elution of the alkali-metal ion from such a base material had to be controlled.

[0010] The purpose of this invention is to offer the white conductivity matter which is excellent in conductivity and a whiteness degree, and can control the elution of the alkali-metal ion from a base material, and its manufacture approach.

[0011]

[Means for Solving the Problem] The 1st tin oxide layer in which invention according to claim 1 was the white conductivity matter with which the conductive layer which consists of tin oxide was formed on the front face of a base material, and the conductive layer was formed on the front face of a base material, and was formed from the second tin compound, It consists of the 2nd tin oxide layer which was formed on the 1st tin oxide layer, and was formed from the stannous compound, and is characterized by the antimony component containing in the 1st tin oxide layer.

[0012] In invention according to claim 1, the antimony component contains in the 1st tin oxide layer formed on the base material front face. Therefore, the elution of alkali-metal ion, such as a potassium from a base material and sodium, can be controlled.

[0013] Moreover, in invention according to claim 1, the 2nd tin oxide layer is formed from the stannous compound. Although this stannous compound oxidizes by heat-treatment and serves as a tin oxide layer of tetravalent tin since it is a divalent tin compound, it is easy to generate an oxygen defect in this case. Therefore, an antimony component is not contained, but many oxygen defects exist and high conductivity is discovered also for \*\*. Therefore, since the whiteness degree of the 2nd tin oxide layer near a front face and conductivity can be raised, a whiteness degree high as white conductivity matter and high conductivity can be discovered. In addition, in invention according to claim 1, when the antimony component does not contain in the 2nd tin oxide layer, or when minute amount content is carried out, it can consider as a whiteness degree high as mentioned above. However, since the whiteness degrees needed differ according to the purpose, an application, etc. of the white conductivity matter, according to the purpose, the application, etc., the antimony component may contain them in the 2nd tin oxide layer.

[0014] In invention according to claim 2, it sets to the white conductivity matter according to claim 1, and the content of the antimony component in the 1st tin oxide layer is  $\text{SnO}_2$  in the 1st tin oxide layer. It is  $\text{Sb}_2\text{O}_3$  to the amount of conversions 100 weight section. It carries out and is 1 - 50 weight section. If there are too few contents of the antimony component in the 1st tin oxide layer, it may become inadequate controlling [ of the elution of the alkali-metal ion from a base material ]. Moreover, if there are too many contents of an antimony component, there will be an inclination which wears a black tint in color tone, and it will become impossible to expect conductive improvement as compared with a content, and will become disadvantageous economically.

[0015] In invention according to claim 3, the base material eluted in alkali-metal ion from a front face is used as a base material. As mentioned above, since the antimony component contains in the 1st tin oxide layer, the elution of such alkali-metal ion can be controlled and the white conductivity matter which used such a base material for the application which causes trouble by existence of alkali-metal ion, for example, applications, such as the electronics field, can be used.

[0016] Invention according to claim 4 is the approach of manufacturing the white conductivity matter which has the conductive layer which consists of tin oxide on the front face of a base material. Distribute a base material in water, consider as a water dispersion, and the second tin compound and an antimony compound are added to this water dispersion. The second tin which deposits by making this react, and the water-insoluble nature matter of antimony are made to deposit on a base material front face. Next, a stannous compound is added to this water dispersion, after making the water-insoluble nature matter of the first tin which deposits by making this react deposit on the second tin and the water-insoluble nature matter of antimony, it dehydrates, and it is characterized by heat-treating by the

oxidizing atmosphere.

[0017] In invention according to claim 5, in the manufacture approach of invention according to claim 4, in case the second tin compound, an antimony compound, and a stannous compound are added to a water dispersion, each water-insoluble nature matter is deposited by adding an alkaline solution to coincidence and adjusting pH of a water dispersion to 2-5.

[0018] It is the addition of the antimony compound [ according to invention according to claim 6 ] in the 1st tin oxide layer SnO<sub>2</sub> of the addition of the second tin compound It is Sb<sub>2</sub>O<sub>3</sub> to the amount of conversions 100 weight section. It carries out and is considering as 1 - 50 weight section. The reason made into the addition of such an antimony compound is the same as that of invention according to claim 2.

[0019] Moreover, in invention according to claim 7, the base material eluted in alkali-metal ion from the front face is used like fibrous potassium titanate as a base material. As well as invention according to claim 3 when such a base material is used, the elution of the alkali-metal ion from a base material front face can be controlled by the 1st tin oxide layer formed from the second tin compound and antimony compound which are formed on a base material front face.

[0020] Hereafter, the technical matter common to each invention according to claim 1 to 7 is explained as "this invention." Especially the base material used in this invention is not limited, and a comb can use the thing of various configurations, such as balun-like matter, also for the shape of needlelike or fibrous material, the shape of a scale, the tabular matter, powder, and a grain. Moreover, you may be a natural mineral and may be the artificial matter. As fibrous or quality of a needlelike substance, if it is a natural product, there will be asbestos, straw SUTONAITO, etc. and a potassium titanate whisker, gypsum-fibrosus fiber, xonotlite, silicon carbide fiber, an alumina fiber, titanium oxide fiber, a glass fiber, a silica fiber, zinc-oxide fiber, etc. will be mentioned as an artifact. Moreover, as the shape of a scale, and tabular matter, although the mica system matter is common, talc, etc. a glass flake, an alumina flake, a titania flake, etc. are mentioned. Moreover, as matter of the shape of powder, a grain, and balun, titanium oxide, silica powder, a zinc white, a calcium sulfate, a barium sulfate, a calcium silicate, a kaolinite, silica balun, glass balun, a silicone bead, a glass bead, etc. are mentioned. The base material used in this invention is not limited to these examples, and other base materials can be used for it.

[0021] In invention according to claim 5, since it manufactures adjusting pH of the water dispersion which distributed the base material to 2-5, it is desirable in an acidic solution that it is the insoluble matter. Moreover, in invention according to claim 4 to 7, since water is distributed and a base material is manufactured, it is desirable that it is the base material which can be distributed underwater.

[0022] The second tin compound used in this invention is a tetravalent tin compound, for example, a stannic chloride, the second tin of a sulfuric acid, the second tin of a nitric acid, etc. can be used for it. The stannous compound used in this invention is a divalent tin compound, for example, stannous chloride, stannous sulfate, the first tin of a nitric acid, etc. can be used for it.

[0023] The antimony compound used in this invention is a compound of trivalent antimony, and although it is good with the compound of various gestalten, such as a chloride, a sulfate, and a nitrate, generally acquisition is easy for an antimony trichloride.

[0024] the 1st tin oxide layer which the conductive layer of the white conductivity matter of invention according to claim 1 is formed on a base material front face, and is formed from the second tin compound, and contains the antimony component -- this -- it is characterized by consisting of the 2nd tin oxide layer which was formed on the 1st tin oxide layer, and was formed from the stannous compound. As an amount with which the conductive layer which consists of a conductive layer which consists of tin oxide, i.e., the 1st tin oxide layer, and the 2nd tin oxide layer covers a base material, it is SnO<sub>2</sub> to the base material 100 weight section. It is 10 - 30 weight section that it is the 5 - 100 weight section in conversion desirable still more preferably. If the conductivity which will be discovered if there are too few amounts of covering of a conductive layer is not enough and there is conversely, since conductive improvement cannot be desired as compared with the amount of covering, it also becomes disadvantageous one economically and, generally a whiteness degree also falls. [ too much ]

[0025] As for the amount of covering of the 1st tin oxide layer, it is desirable that they are more than 3

weight sections at least to the base material 100 weight section. It is 5 - 20 weight section to the base material 100 weight section still more preferably. Moreover, the content of the antimony component in the 1st tin oxide layer is  $\text{SnO}_2$  of the 1st tin oxide layer like the publication to claim 2. It is  $\text{Sb}_2\text{O}_3$  to the amount of conversions 100 weight section. It carries out and is 1 - 50 weight section.

[0026] Since the 2nd tin oxide layer is formed from a stannous compound, oxidizes and makes divalent tin tetravalent tin oxide as mentioned above, more oxygen defects exist and it gives higher conductivity. Moreover, since an antimony component is not contained as an indispensable component, the whiteness degree of the 2nd tin oxide layer can be raised, and, as a result, the whiteness degree of the white conductivity matter itself can be raised. Although such an amount of covering especially of the 2nd tin oxide layer can be set as arbitration according to the physical properties which are not limited and are needed, it is 5 - 20 weight section that they are more than 3 weight sections at least to the base material 100 weight section desirable still more preferably.

[0027] Invention according to claim 4 is the approach that the white conductivity matter of invention according to claim 1 to 3 can be manufactured. In invention according to claim 4, a base material is first distributed in water and it considers as a water dispersion. The concentration of the base material in this water dispersion is suitably set up according to the base material to be used, and sufficient mixed stirring is possible for it, and it should just be the concentration by which the water-insoluble nature matter which carries out adhesion deposition on a base material in a back process can adhere to homogeneity.

[0028] The second tin compound and an antimony compound are added as the 1st step by the water dispersion of a base material. Being added with the gestalt of a solution is desirable still more desirable, and this second tin compound and antimony compound are added with the gestalt of a water solution. The water-insoluble nature matter is made to adhere and deposit on the front face of a base material by using the second tin compound and antimony compound which were added by the water dispersion as water-insoluble nature matter, such as for example, the second tin hydroxide and an antimony hydroxide, by a hydrolysis reaction etc. A thing [ making it react, an alkali solution being dropped at addition and coincidence and keeping pH of a water dispersion like to the acid field of 2-5 ] according to claim 5 is desirable in the case of addition of the second tin compound and an antimony compound. Since the water-insoluble nature matter of the second tin which deposits by maintaining pH in a system at the acid field of 2-5 deposits in homogeneity more with the gestalt which can be covered to a base material, more uniform covering is attained. As a dropped alkali solution, a sodium hydroxide, a potassium hydroxide, a sodium carbonate, potassium carbonate, an ammonium carbonate, aqueous ammonia, etc. can be used, for example. As for the second tin compound and antimony compound to add, it is desirable that it is a salt of the same kind. That is, when using chlorination tin, for example as the second tin compound, it is desirable to use an antimony trichloride as an antimony compound. Moreover, as for the second tin compound and an antimony compound, adding as a mixed solution is desirable.

[0029] A stannous compound is added to a water dispersion as the 2nd step behind the 1st above-mentioned step. When hydrolysis etc. carries out the stannous compound added to the water dispersion, the water-insoluble nature matter of the first tin, such as the first tin of hydroxylation, is deposited, and the adhesion deposition of the water-insoluble nature matter of this first tin is carried out on the second tin and the water-insoluble nature matter of antimony. A thing [ making a stannous compound react also in the case of addition of this stannous compound, adding an alkali solution to addition and coincidence of a stannous compound, and keeping pH of a water dispersion like to them to the acid field of 2-5 ] according to claim 5 is desirable. The thing same as an alkali solution as the alkali solution added in the 1st above-mentioned step can be used. If stannous compound solutions, such as stannous chloride, are added and a hydroxide is generally deposited in an acid field, viscosity goes abruptly up and formation of the uniform enveloping layer to a base material top is difficult. However, in invention according to claim 5, since the second tin and the water-insoluble nature matter of antimony have already covered to homogeneity on a base material, most viscosity rises in a system are not seen, but can form the water-insoluble nature matter of the first tin on it at homogeneity.

[0030] As mentioned above, although the antimony component contains as an indispensable component



in the 1st tin oxide layer, the antimony component is not contained as an indispensable component in the 2nd tin oxide layer. Therefore, in the 2nd step, although what is necessary is just to add the solution of only a stannous compound, an antimony component may contain as an arbitration component also in the 2nd tin oxide layer as mentioned above. Therefore, in such a case, the mixed solution of a stannous compound and an antimony compound may be added. As mentioned above, although conductivity will improve if an antimony component is made to exist in the 2nd oxide layer, a color tone wears a black tint. Therefore, when the whiteness of a color tone other than conductivity is required as white conductivity matter, it is desirable that an antimony component does not exist in the 2nd tin oxide layer, therefore it is desirable in the 2nd step to mix an antimony compound and not to add.

[0031] Also at a room temperature, although the solution temperature of the water dispersion in the 1st above-mentioned step and the 2nd step is possible, it is preferably warmed at about 50-80 degrees C. By such warming, a more uniform reaction is possible.

[0032] As for the addition of the second tin compound in the 1st step and the 2nd above-mentioned step, an antimony compound, and a stannous compound, an addition from which the antimony component in the 1st tin oxide layer serves as the desired amount of covering and a content is chosen as the 1st tin oxide layer and the 2nd tin oxide layer list.

[0033] In solution temperature as it is, while after the 1st above-mentioned step and 2nd-step deposit reaction termination is for a while, stirring, it is desirable to leave it for about 0.5 to 5 hours. Formation of a firmer enveloping layer can be promoted by such neglect. Under the present circumstances, pH may hold pH under reaction as it is, and may raise and hold pH a little within the limits of an acid field.

[0034] Next, after filtering a water dispersion and dehydrating, the base material which carried out adhesion processing is dried. A desiccation process may be performed in a series of processes to continuing heating down stream processing. After desiccation, on a base material, the water-insoluble nature matter which carried out adhesion deposition is heat-treated, and the conductive layer which uses tin oxide as a principal component is formed. Whenever [stoving temperature] is usually heat-treated at the temperature of about 350-600 degrees C, although it will not be especially limited if it is the temperature which can make the enveloping layer on a base material the tin oxide which has conductivity. Moreover, although the time amount of heat-treatment changes with processing temperature etc., about 1 - 3 hours is usually preferably suitable for it for 30 minutes to 5 hours.

[0035] Since the ambient atmosphere of heat-treatment needs to oxidize and needs to make the water-insoluble nature matter of the first tin which is divalent tin tetravalent tin oxide, it is performed by the oxidizing atmosphere in which oxygen was contained. Therefore, it can heat-treat in atmospheric air. For this reason, it is not necessary to seal like heat-treatment by the non-oxidizing atmosphere or the reducing atmosphere, and to heat-treat.

[0036] The white conductivity matter of this invention has the 2nd tin oxide layer formed on the 1st tin oxide layer formed on the front face of a base material, and the 1st tin oxide layer, and the 2nd tin oxide layer is tin oxide formed from a stannous compound, and even if an oxygen defect tends to exist and an antimony component does not exist, it can discover high conductivity. Therefore, a whiteness degree is high and can consider as the white conductivity matter excellent in conductivity. Moreover, since the antimony component contains in the 1st tin oxide layer formed on a base material front face, also when the base material which is easy to elute alkali-metal ion like fibrous potassium titanate as a base material is used, the elution of the alkali-metal ion from a base material front face can be controlled.

[0037]

[Embodiment of the Invention] Hereafter, this invention is not limited by the following examples although a concrete example explains this invention to a detail further.

[0038] Having distributed 250g (the "TISMO-D-trade name N" Otsuka chemistry company make) of example 1 potassium titanate fibers in 2500ml of water, and keeping water temperature at 70 degrees C, with the agitator, it stirred for 10 minutes and slurred. Next, 130g (23 % of the weight of Sn conversions) of water solutions of a stannic chloride and the mixed solution made to dissolve 12.8g of antimony trichlorides in 66.6g of 12% of the weight of hydrochloric acids were dropped over about 1 hour into this slurry, 15% of the weight of the sodium-hydroxide water solution was made separately



dropped at it and coincidence, and pH of the whole reaction mixture was maintained at the range of 3-4. After the 1st-step dropping reaction was completed, it stirred for 30 minutes, maintaining pH as it is and solution temperature.

[0039] Next, 130g (23 % of the weight of Sn conversions) of water solutions of stannous chloride and the mixed solution of 100g of 12% of the weight of hydrochloric acids were dropped over about 1 hour, 15% of the weight of the sodium-hydroxide water solution was separately dropped at coincidence, and pH was kept being the same as that of the 1st step in the range of 3-4. After the 2nd-step dropping reaction was completed, it stirred for 30 minutes, maintaining pH as it is and solution temperature. Then, after cooling radiationally to a room temperature, the resultant was filtered, rinsed and dehydrated and it dried. 450 degrees C of obtained desiccation articles were heat-treated for 1 hour in the atmospheric air which is among an oxidizing atmosphere, and the white conductivity matter was obtained.

[0040] The white conductivity matter was obtained like the example 1 except changing the fiber used as example 2 base material into titanium oxide (rutile) fiber (a trade name "FTL-200", Ishihara Sangyo Kaisha, Ltd. make).

[0041] As example 3 base material, white conductivity powder was obtained like the example 1 except using the spherical powder (trade name "Nipsil L-300" Japan silica industrial company make, mean particle diameter of 7 micrometers) of oxidation silicon.

[0042] The white conductivity matter was obtained like the example 1 except keeping pH under reaction a little superfluous in 15% of the weight of the sodium-hydroxide water solution added during example 4 reaction to the alkalinity of the range of 10-11.

[0043] The sodium-hydroxide water solution was made a little superfluous like example 5 example 4, and the white conductivity matter was obtained like the example 2 except maintaining pH under reaction at the alkalinity of 10-11.

[0044] It slurred having distributed 250g of the same potassium titanate fibers as example of comparison 1 example 1 in 2500ml of water, and keeping at 70 degrees C. Next, 260g (23 % of the weight of Sn conversions) of water solutions of stannous chloride and the mixed solution made to dissolve 12.8g of antimony trichlorides in 66.6g of 12% of the weight of hydrochloric acids were dropped over about 1 hour into this slurry, 15% of the weight of the sodium-hydroxide water solution was separately dropped at it and coincidence, and pH was maintained at the range of 3-4. Then, after stirring for 30 minutes and cooling radiationally to a room temperature, keeping pH as it is and solution temperature being the same as that of an example 1, it dried like the example 1, and it heat-treated and the white conductivity matter was obtained.

[0045] The white conductivity matter was obtained like the example 1 of a comparison except changing an example of comparison 2 tin raw material into a stannic chloride.

[0046] the example 3 of a comparison -- the white conductivity matter was obtained like the example 1 except using the mixed solution of the water solution of stannous chloride, an antimony trichloride, and a hydrochloric acid for the 1st step, and using the water solution of a stannic chloride, and the mixed solution of a hydrochloric acid for the 2nd step.

[0047] As an example of comparison 4 tin raw material, the white conductivity matter was obtained like the example 3 of a comparison except using the 1st step and the 2nd step of stannous chloride.

[0048] As an example of comparison 5 tin raw material, the white conductivity matter was obtained like the example 3 of a comparison except using the 1st step and the 2nd step of a stannic chloride.

[0049] The white conductivity matter was obtained like the example 1 of a comparison except using the titanium oxide fiber used in the example 2 as example of comparison 6 base material.

[0050] The white conductivity matter was obtained like the example 2 of a comparison except using the titanium oxide fiber used in the example 2 as example of comparison 7 base material.

[0051] The white conductivity matter was obtained like the example 4 of a comparison except using the titanium oxide fiber used in the example 2 as example of comparison 8 base material.

[0052] The white conductivity matter was obtained like the example 5 of a comparison except using the titanium oxide fiber used in the example 2 as example of comparison 9 base material.

[0053] the example 10 of a comparison -- the white conductivity matter was obtained like the example 1

except not adding an antimony trichloride in the 1st step, but adding only a stannic chloride.

[0054] The raw material of the base material matter in the above-mentioned examples 1-5 and the examples 1-10 of a comparison, the 1st step, and the 2nd step and pH at the time of raw material addition are collectively shown in Table 1. Moreover, the volume resistivity (ohm-cm) of fine particles was measured about the obtained white conductivity matter. In addition, measured value is 100kg/cm<sup>2</sup>. It is the measured value under a load.

[0055] Furthermore, the degree of hunter white of fine particles was measured about the obtained white conductivity matter. Measurement is 1 t/cm<sup>2</sup> to fine particles. A pressure is put. Fine particles (the diameter of 40mm, thickness of 2mm) are produced, and it is JIS. L value (lightness index) specified to Z-8722-8730 was measured, and it considered as the degree of hunter white.

[0056] Furthermore, whenever [ elution / of alkali-metal ion ] was evaluated about the obtained white conductivity matter. After distributing 1g of samples obtained in each example and the example of a comparison in 100ml of deionized water and stirring at a room temperature for 10 hours, the filtrate filtered by the filter paper was measured as an amount (ppm) of K (potassium) ion with atomic-absorption-spectrometry equipment.

[0057] The volume-resistivity value of the fine particles of each above-mentioned example and each example of a comparison, the degree of hunter white, and the amount of elution potassium ion are shown in Table 1.

[0058]

[Table 1]

		基 材 物 質			第1段階の原料			第2段階の原料		pH		粉体の 体積抵抗率 ( $\Omega \cdot \text{cm}$ )	粉体の ハンター 白度	溶出物 の量 (ppm)
		チタン酸カリウム繊維	二酸化チタン繊維	酸化珪素粉末	SnCl <sub>2</sub>	SnCl <sub>4</sub>	SbCl <sub>3</sub>	SnCl <sub>2</sub>	SnCl <sub>4</sub>	酸性	加剤性			
実 施 例	1	○				○	○	○		○		$1.0 \times 10^1$	79	10
	2		○			○	○	○		○		$9.0 \times 10^0$	74	0
	3			○		○	○	○		○		$4.0 \times 10^2$	72	0
	4	○				○	○	○			○	$4.0 \times 10^2$	68	250
	5		○			○	○	○			○	$3.0 \times 10^2$	64	0
比 較 例	1	○			○		○			○		$6.0 \times 10^5$	82	11
	2	○				○	○			○		$4.0 \times 10^3$	80	10
	3	○			○		○		○	○		$5.0 \times 10^5$	81	12
	4	○			○		○	○		○		$6.0 \times 10^5$	82	10
	5	○				○	○		○	○		$3.0 \times 10^3$	79	11
	6		○		○		○			○		$5.0 \times 10^5$	80	0
	7		○			○	○			○		$3.0 \times 10^3$	77	0
	8		○		○		○	○		○		$4.0 \times 10^5$	80	0
	9		○			○	○		○	○		$2.0 \times 10^3$	78	0
	10	○				○		○		○		$2.0 \times 10^5$	91	270

[0059] The white conductivity matter of the examples 1-5 according to this invention has a low volume resistivity, and it turns out that it has the outstanding conductivity so that clearly from Table 1. Moreover, the degree of hunter white is high and it turns out that it has a high whiteness degree. Furthermore, it turns out that the elution of the alkali-metal ion from a base material is controlled.

[0060]

[Effect of the Invention] The white conductivity matter of this invention is white conductivity matter which is excellent in conductivity and a whiteness degree, and can control the elution of the alkali-metal ion from a base material.

[0061] According to the manufacture approach of this invention, the white conductivity matter of this invention can be manufactured efficiently.

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[Translation done.]